Supplemental Material

Exploration of the Rapid Effects of Personal Fine Particulate Matter Exposure on Arterial Hemodynamics and Vascular Function during the Same Day among a Sub-set of Individuals Living in the Detroit Area

Robert D. Brook[1], Hwashin H. Shin[2], Robert L. Bard[1], Richard T. Burnett[2], Alan Vette[3], Carry Croghan[3], Jonathan Thornburg[4], Charles Rodes[4], Ron Williams[3]

[1] Division of Cardiovascular Medicine, University of Michigan, Ann Arbor, MI, USA
[2] Biostatistics and Epidemiology Division, Health Canada, Ottawa, Ontario, Canada
[3]U.S. Environmental Protection Agency, Research Triangle Park, NC, USA
[4]RTI International, Research Triangle Park, NC, USA

Table of Contents:

Supplement Table 1: Total Cohort Subject Characteristics (n=51)

FACTOR	n	MEAN or %	SD	Minimum	Q1*	Median	Q3*	Maximum
Age (years)	51	43.1	14.7	19	33	44	54	80
Sex	51							
Female	38	75%						
Male	13	25%						
Race	51							
African American	28	55%						
Caucasian	22	43%						
American Indian	1	2%						
Body mass index (Kg/m^2)	49	30.8	8.2	16.7	26.3	29.8	34.7	56.5
SBP (mm Hg)	260	124.8	17.6	91	112	124	136	205
DBP (mm Hg)	260	74.1	10.1	50	66	74	82	101
HR (beats/min)	260	75.1	10.9	51	68	75	81	103
Total Cholesterol (mg/dL)	44	242.0	171.2					
High density lipoprotein cholesterol (mg/dL)	44	41.7	11.3					
Triglycerides (mg/dL)	44	153.9	117.7					
Blood glucose (mg/dL)	44	112.5	61.9					
BAD (mm)	239	4.1	0.9	2.1	3.5	4.0	4.7	6.5
FMD (%)	228	3.4	5.3	-12.2	0.3	2.9	6.4	19.7
NMD (%)	113	15.2	6.7	0.19	10.3	14.8	19.0	32
Average of 24 hourly $PM_{2.5}$ ($\mu g/m^3$)	234	38.0	51.1	1.6	12.2	23.7	43.3	475.0
Daily average of personal $PM_{2.5}$ ($\mu g/m^3$)	229	22.5	26.0	1.3	10.0	16.0	26.5	225.4
Daily average of ambient $PM_{2.5}$ ($\mu g/m^3$)	251	15.2	7.3	2.8	9.6	12.8	19.2	38.9

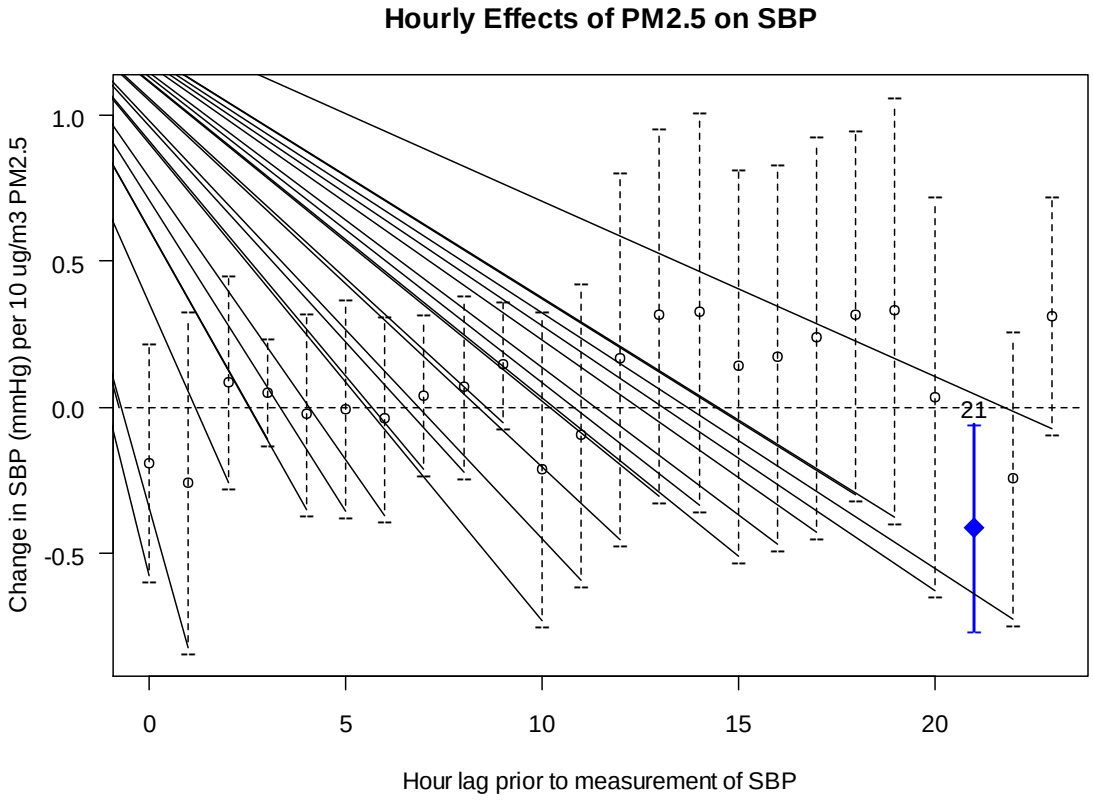
N, number of observations; SD, Standard deviation; SBP, systolic blood pressure (BP); DBP, diastolic BP; HR, heart rate; BAD, brachial artery diameter; FMD, flow-mediated dilatation; NMD, nitroglycerin-mediated dilatation.

*Q1, 25^{th} percentile; Q3, 75^{th} percentile

Supplement Table 2:Total Cohort Subject Health Status

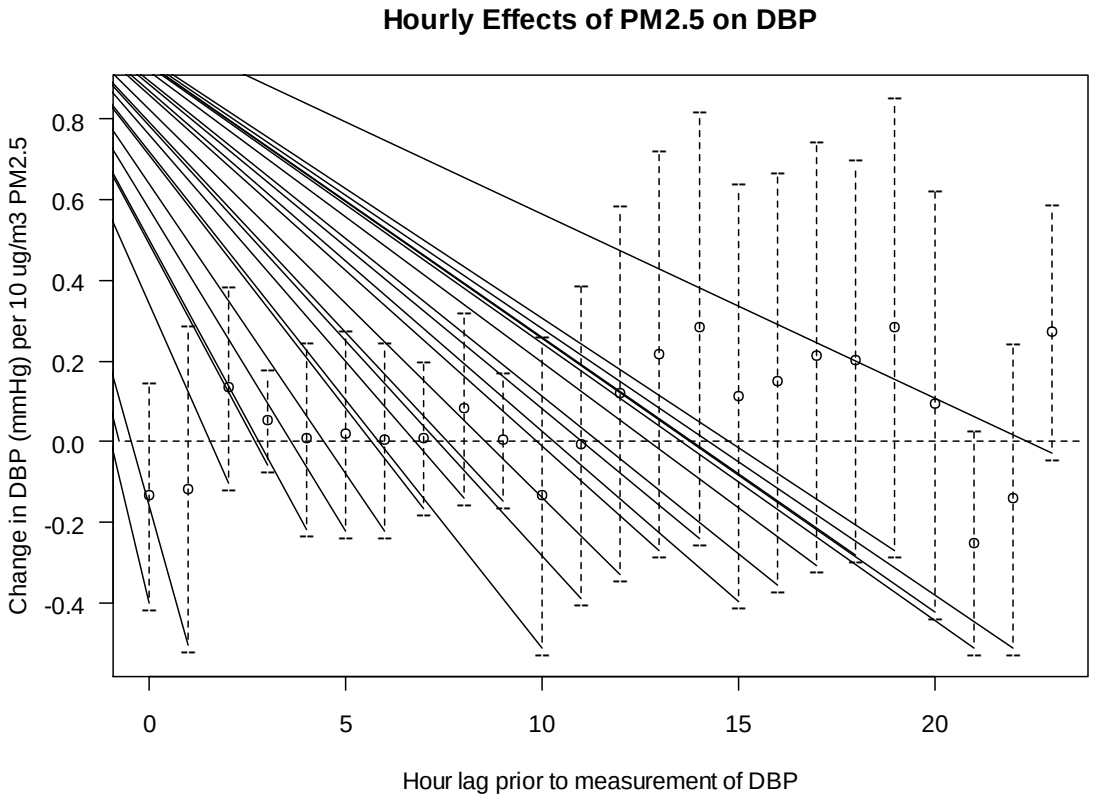
Self Reported Diagnosis of:	**N (%)**	**Number of Subjects Using Prescribed Medications (%)**
Hypertension	25 (49)	20 (39)
Hyperlipidemia	16 (31)	7 (14)
Diabetes Mellitus	11 (22)	7 (14)
Family History of CAD	19 (37)	
Self-Reported Heart Disease History:	10 (19)	
Angina	3 (6)	
Myocardial Infarction	3 (6)	
Congestive Heart Failure	4 (8)	
Cardiovascular Medications Used:		
ACEI/ARB	11 (22)	
Diuretic	3 (6)	
Beta Blocker	5 (10)	
Calcium Channel Blocker	7 (14)	

ACEI, angiotensin converting enzyme; ARB, angiotensin receptor blocker; CAD, coronary artery disease.



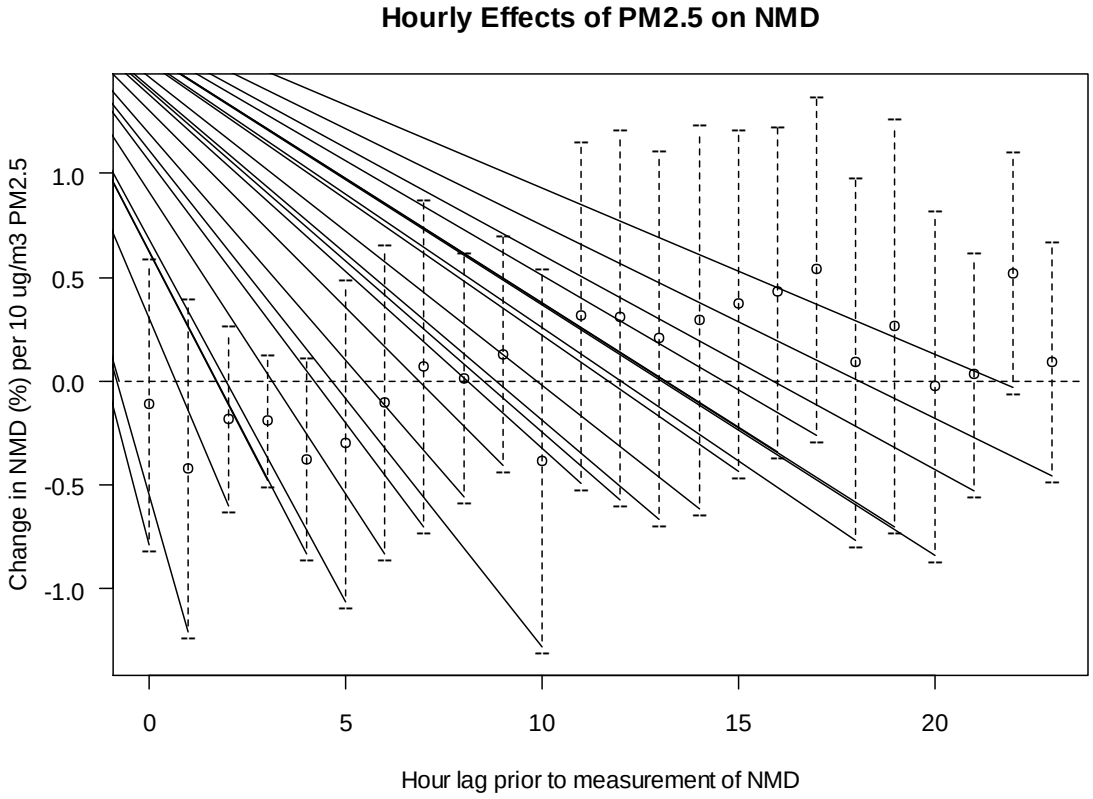
Supplemental Figure 1 Personal $PM_{2.5}$ and Systolic Blood Pressure (BP)

The associations of hourly TPE levels with systolic BP changes according to the lag period of exposure. For example, hour 0 = period from 0-60 minutes prior to the CV measurement. Points equal the multivariate adjusted HR association (β coefficient per 10 μg/m^3 increase in TPE ± 95% confidence intervals) for each hourly time point from the linear mixed model (1). Statistically significant time points are bolded in square shape for $p<0.01$ and in diamond shape for $p<0.05$. The x-axis is the period of time (hour lag) prior to the measurement of the CV outcome.



Supplemental Figure 2 Personal $PM_{2.5}$ and Diastolic Blood Pressure (BP)

The associations of hourly TPE levels with diastolic BP changes according to the lag period of exposure. For example, hour 0 = period from 0-60 minutes prior to the CV measurement. Points equal the multivariate adjusted BAD association (β coefficient per 10 μg/m^3 increase in TPE ± 95% confidence intervals) for each hourly time point from the linear mixed model (1). Statistically significant time points are bolded in square shape for $p<0.01$ and in diamond shape for $p<0.05$. The x-axis is the period of time (hour lag) prior to the measurement of the CV outcome.



Supplemental Figure 3 Personal $PM_{2.5}$ and Nitroglycerin-mediated Dilatation (NMD) The associations of hourly TPE levels with NMD changes according to the lag period of exposure. For example, hour 0 = period from 0-60 minutes prior to the CV measurement. Points equal the multivariate adjusted FMD association (β coefficient per 10 μg/m^3 increase in TPE ± 95% confidence intervals) for each hourly time point from the linear mixed model (1). Statistically significant time points are bolded in square shape for $p<0.01$ and in diamond shape for $p<0.05$. The x-axis is the period of time (hour lag) prior to the measurement of the CV outcome.